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Research Report 1284

# DEVELOPMENT OF CAI PERFORMANCE MEASURES: TACFIRE TACTICAL DATA SYSTEM

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MANPOWER AND EDUCATIONAL SYSTEMS TECHNICAL AREA



U. S. Army
Research Institute for the Behavioral and Social Sciences

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57

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This is the sixth and last report in the series which describes the utilization of tactical computers for training. This report summarizes the development of computer-assisted instruction (CAI) performance measures in the area of the TACFIRE tactical data system.

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Embedded Training

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FOREWORD

This is the last in a series of six reports by the System Development Corporation (SDC) which describes the utilization of tactical computers for training. Specifically, this report (RR 1284) summarizes the development of computer-assisted instruction (CAI) performance measures in the area of the TACFIRE tactical data system. The other five reports under contract DAHC19-75-C-0031 are: Analysis of System and Training Requirements (RN 80-29), Job/Task and Training Analysis (RR 1281), Field Evaluation Plan (RN 80-30), Job/Task and Training Analysis-Ammunition and Fire Unit (AFU) Module (RR 1282) and Analysis of System and Training Requirements, a summary report (1283).

This Research Report was a joint venture between W. G. Hoyt, A. K. Butler and P. W. Leung from SDC and J. E. Germas and J. T. Larson from ARI, and represents a milestone in the development of the "embedded training" concept first expounded by ARI's James D. Baker in a paper presented at the Tri-Service R&D Coorindation Meeting hosted by the ONR Branch Office in London, England in February 1968.

JOSEPH ZEIDNER
Technical Director

## EXECUTIVE SUMMARY

The purpose of this project was to examine the feasibility of using computer-assisted instruction (CAI) as an embedded, stand-alone, individualized training program for instructing operational users of the TACFIRE Tactical Data System.

TACFIRE courseware, based upon an analysis of system and training requirements and a Job/Task and Training Analysis, has been developed and produced in five functional areas: Tactical and Technical Fire Control (Fire Mission Module); Artillery Target Intelligence (ATI Module); Ammunition and Fire Unit (AFU Module); Support (SPRT Module); and System (SYS Module). Courseware consists of independent modular blocks of instruction containing 44 PLANIT Lessons (23 Student Lessons) and 10 performance based module pre- and post-tests totaling approximately 3,600 PLANIT frames. Average course time for this individualized, self-paced embedded training program is estimated at 40 hours. Preliminary estimates indicate 25% to 35% of battalion fire direction center (FDC) operations are covered. Based on this estimate, for twice the cost of the current effort the remainder can be done. Courseware applies also to DivArty FDC operations, as well as a spin-off to fire support officer (FSO) and fire support element (FSE) operations.

The Courseware is well documented. The specific tasks, criterion and enabling objectives, and test items are well defined, having been developed in accordance with the TRADOC Systems Approach to Training (SAT), Systems Engineering of Training, TRADOC Reg 350-100-1, and with the "functional context plus" approach. This approach considers the job (tasks), what the student brings into the learning situation and how to arrange lesson modules to be maximally supportive of the student during the learning process. The course starts in a context familiar to the student, providing a bridge between his previous experience (manual field artillery) and TACFIRE. This makes it easier for the student to learn, relate, and integrate TACFIRE operations. This approach further provides an organization (course and lesson design) where earlier lessons, such as fire missions (TTFC-FM function), provide the basis and requirement for other operations, such as fire unit and observer location (AFU function). The "why," "effect," and "use" of various operations is made explicit as a natural part of course development. This also makes it easy for the student to learn, relate and integrate TACFIRE operations. It also provides for repeated reinforcement of TACFIRE operations during the course.

The TACFIRE course executes properly on the TACFIRE system, has been reviewed for content and tactical employment by personnel of the U.S. Army Field Artillery School (USAFAS), and is operationally ready for implementation. The courseware is expected to produce individuals who can perform in an operational setting, under light load conditions, the tasks/job covered in the course. An extensive on-the-job training (OJT) period of 5 or 6 months should not be required. Further training such as a carefully planned series of exercises (light load, medium load, heavy load), each stressing various objectives, should result in an operational ready individual within a short time frame.

This program can be used on any TACFIRE system for training, either in a school or field environment.

The courseware is updated quickly and easily as changes in tactical doctrine or equipment occur. This was fully demonstrated during the content review by USAFAS personnel when changes were made on-line as each module was reviewed. Cost of courseware for each additional TACFIRE system is minimal, i.e., the cost of duplicating courseware computer tape and printing additional copies of the offline course exhibits.

Automated instruction (AI) can be developed for all the functional areas. There are no methodological restrictions. The determining factor for those selected for this project was that they were more critical for fire direction.

Recommendations include:

1. Complete the courseware development to provide a permanent embedded training program, easily modified to meet changes in tactical doctrine and equipment, and easily duplicated to as many TACFIRE systems as required.

2. Use courseware to provide orientation and initial exposure to TACFIRE.

3. Use TACFIRE AI Module tests to determine need for refresher training.

4. Use the methodology and restructure the TACFIRE AI course for command and staff personnel who are not "direct" users of the system.

5. Use the proven methodology and inherent classification of the system components to develop a classified AI training program applicable to nuclear weapons.

6. Develop a simplified reference manual for ACC operators.

7. Develop a computerized production system for generating exercises.

8. Develop embedded training programs for other tactical data systems.

9. Develop or use TACFIRE modules to train reserve units affiliated with active Army units.

Documentation produced in this project, including this final report, are as follows:

Utilization of Tactical Computers for Training: Analysis of System and Training Requirements, 20 June 1975. (Research Note 80-29).

Utilization of Tactical Computers for Training: Job/Task and Training analysis, 20 August 1975. (Research Report 1281).

*Utilization of Tactical Computers for Training: Field Evaluation Plan*, 5 December 1975. (Research Note 80-30).

Utilization of Tactical Computers for Training: Job/Task and Training Analysis - Ammunition and Fire Unit (AFU) Module, 1 March 1976. (Research Report 1282).

Utilization of Tactical Computers for Training: Summary Report. (Research Report 1283).

TACFIRE AI courseware and module tests in the form of card decks, course listings and off-line course exhibits.

DEVELOPMENT OF CAI PERFORMANCE MEASURES:
TACFIRE TACTICAL DATA SYSTEM

CONTENTS

CONTENTS (Cont'd)

FIGURES

# DEVELOPMENT OF CAI PERFORMANCE MEASURES: TACFIRE TACTICAL DATA SYSTEM

Army learning is becoming more decentralized, placing greater emphasis on unit and individual training programs. This shift in emphasis has led to capitalizing on the inherent training capabilities of Army Tactical Data Systems.

In May 1975 the System Development Corporation was tasked by the U.S. Army Research Institute to develop embedded, individualized training programs for users of the TACFIRE Tactical Data System, a computerized field artillery command and control system. The computer-assisted instruction (CAI) language used was PLANIT (Programming Language for Interactive Teaching).

The five major phases of this project are shown in Figure 1.

Phase I - Analyze System and Training Requirements
Phase II - Perform Job/Task and Training Analysis
Phase III - Develop Courseware
Phase IV - Install Courseware
Phase V - Develop Field Evaluation Plan

Figure 1. Major project phases.

Forty hours of TACFIRE CAI courseware and performance tests were developed under this project, and the training program can be run on any TACFIRE system. The program was developed to train the Battalion Fire Direction Officer and Fire Direction Sergeant in TACFIRE Fire Direction Center (FDC) operations. The various FDCs are the focal points in the TACFIRE system, as shown in Figure 2. The Artillery Control Console, Figure 3, is used to conduct FDC operations and also to administer the computer-assisted instruction (CAI). This paper reports on the development of CAI performance measures of job proficiency for these TACFIRE Tactical Data System users.

Each of the phases in Figure 1 has an impact on the development of measures of job proficiency. The first four phases are concerned with the development of the concepts, principles, procedures, tasks, and products that are part of the measurement development process. The fifth phase specifies how performance measures will be administered. These concepts, principles, and procedures are relevant to the development of any job-based performance measures, whether they are administered in a CAI mode or in another mode. The contribution of the first three phases is covered in the paragraphs that follow.

## Phase I. Analyze System and Training Requirements

The process of developing performance measures starts with the analysis of system and training requirements. The analysis provides the guidelines, principles, and framework for measuring performance.

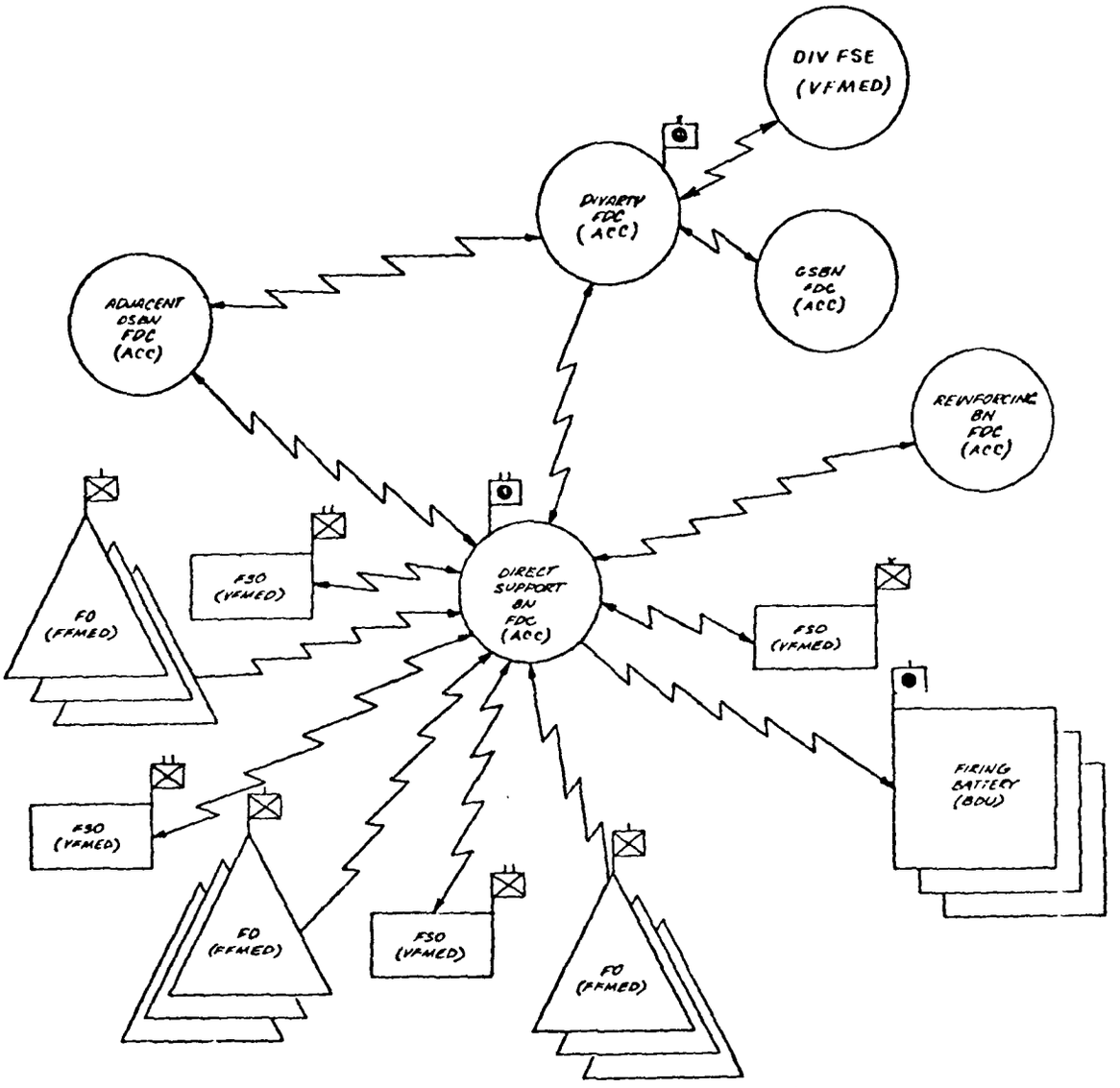


Figure 2. Location of TACFIRE operations personnel and devices.

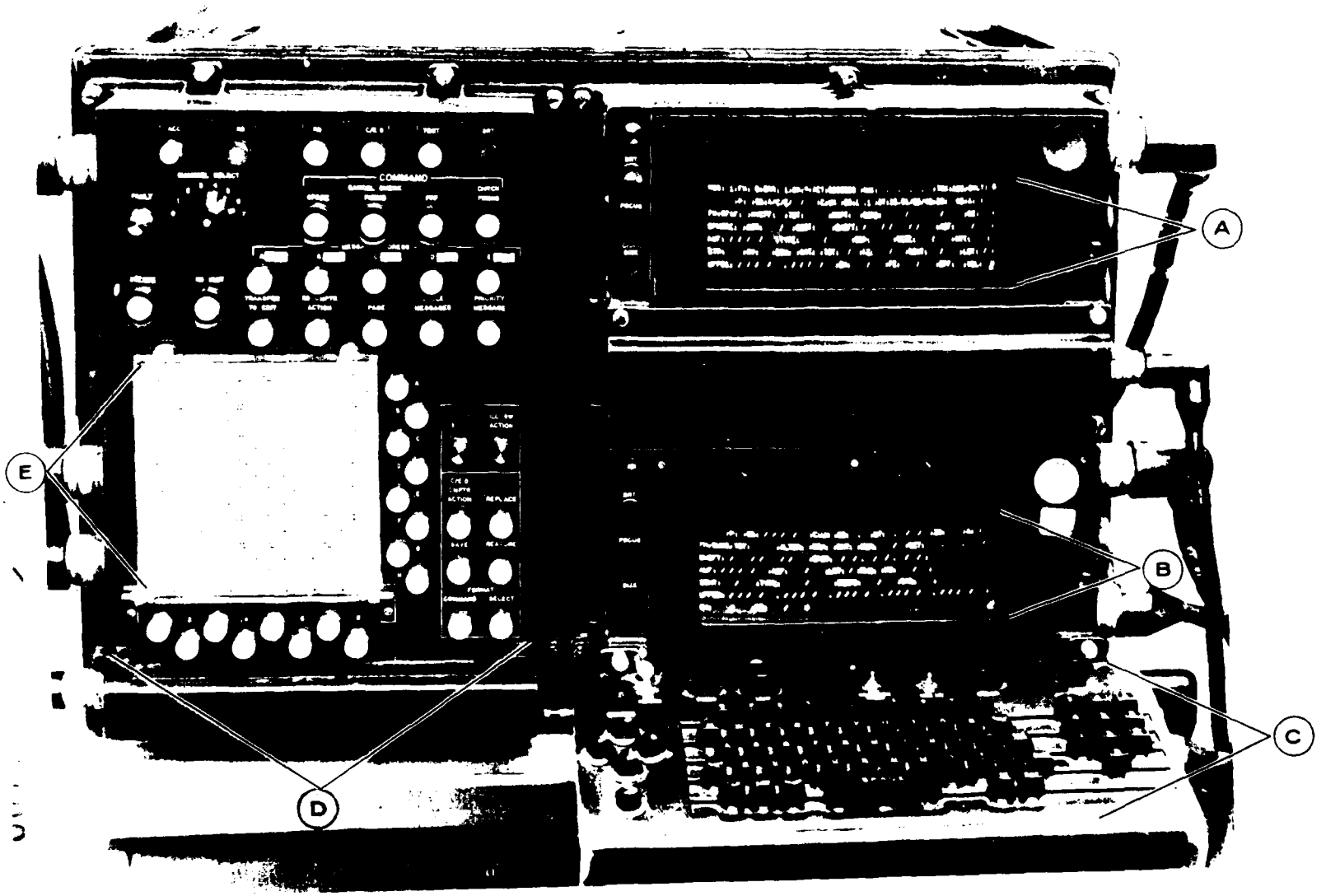


Figure 3. Artillery Control Console (ACC).

For example, analysis of the TACFIRE computerized system shows that it provides rapid and accurate transmission and utilization of field artillery data. Computerized control, as employed in TACFIRE, involves a great deal of specificity: precise inputs, and the filling in of required fields and subfields that allows little margin for error. The formats used are many and varied and the data entries required for each format are extensive and precise, as shown in Figure 4. There are over one hundred of these formats, as listed in Figure 5. Initially, it appears that an extensive memory is required of the TACFIRE users. However, the analysis shows that this is not the case. TACFIRE fire missions and data bases--guns, ammo, target, meteorological, etc.--are input from many different units and agencies (see Figure 2), either directly into the computer or via oral or written communication. Consequently, much of the TACFIRE operation involves the processing--rather than the generation--of data, i.e., recognition rather than memory-recall. The operational requirement becomes (a) processing of completed message formats or (b) the association of input data with a specific format, calling up the format, making the entries specified in the format, and transmitting the data to the units requiring them.

```
     ;P: ;SB: / / /  /   ;C:   ;SG:  ,  ;DT:  ,  /  /  ;ID:    ;A: ;
AFU;BAMOUP;FU: / /C/1 /4Ø ;AMOR: ;AMOE: ;AMOH:X;PLAN:      ;STDODD:H/0;
PROJA:HEA1/H/ 33.Ø;6Ø6 ,HEC1/F/ 33.Ø/6Ø6 ,SMA1/S/ 33.Ø/133 ;
PROJB:SMB1/M/ 33.0/228 ,SMC1/E/ 33.Ø/6   ,SMD1/K/ 33.Ø/12  ;
PLOT:M67 /H/6Ø6 ,M67 /Ø/1Ø44,M67 /F/14Ø1:DTG:  /  /  ;
FZES:PDA /282 ,PDC /6Ø  ,TIA /132 ,TIB /678 ,TIJ /258 ,VTC /36Ø ;BKUP: ;
MYIELD:    ;       /  ,   /       /  ,   /       /  ,   /       /
```

Figure 4. Example of a TACFIRE message format--AFU;BAMOUP.

Thus, the analysis provides guidelines for the development of job performance measures and specifies what should be included in the measurement situation. Much of the performance measurement problem can be alleviated by maintaining the job orientation in measuring performance, i.e., measure performance of the individual in the context in which he will do the job.

## Phase II. Job/Task and Training Analysis

The steps in Phase II are shown in Figure 6. The TAIS (Figure 7) specifies the tasks to be trained and on which performance will be measured. The TAIS records the results of the training analysis and provides behavioral task information leading to the objectives, test items, and course materials. Note that the job orientation is maintained, including the functional relationship between message formats. The criterion and enabling objectives are shown in Figure 8. Criterion objectives specify the type of behavior required for the task and lead directly to the test item. Note the audit trail is maintained by the TAIS number, 3004, in the upper left corner. The test items shown in Figure 9 are developed directly from the criterion and enabling objectives. The guidelines used in developing test items are shown in Figure 10. At this point "what is to be measured" and "how" have been defined. The TAIS, Criterion and Enabling Objectives, and Test Items were reviewed and approved by TACFIRE subject matter experts at the U.S. Army Field Artillery School prior to Phase III, courseware development.

TTFC Function (Fire Mission)

FM;DIR
FM;RFAF
FM;SUBS
FM;QF
FM;NUKE
FM;INTM
FM;HBMPI
FM;OBCO
FM;COMD
FM;MOD
FM;FUSEL
FM;XCLUDE
FM;ATTACK
FM;FC ) output
FM;EOM ) by
FM;CHECK) computer

Non-nuclear Fire Plan Function

NNFP;DIR
NNFP;COMFP
NNFP;INST
NNFP;RESFU
NNFP;FPTU
NNFP;FPA
NNFP;EXECFP
NNFP;COMD
NNFP;MOD
NNFP;FUSEL
NNFP;XCLUDE
NNFP;ATTACK

Artillery Target Intelligence Function

ATI;DIR
ATI;CDR
ATI;AZR
ATI;SHR
ATI;MFR
ATI;SVL
ATI;CBTI
ATI;QUERY
ATI;SRI
ATI;PREFP

Ammunition and Fire Unit Function

AFU;DIR
AFU;UPDATE
AFU;BAMOUP
AFU;MV
AFU;MASK
AFU;REG
AFU;AMOL
AFU;ASR
AFU;MFR
AFU;MFN
AFU;BUILD
AFU;COMD

Support Function

SPRT;DIR
SPRT;MAP
SPRT;DPM
SPRT;GEOM
SPRT;ZNE
SPRT;AIRCOR
SPRT;COMD

System Function

SYS;DIR
SYS;PDS
SYS;FCM
SYS;PCLD
SYS;SBT
SYS;LGSB
SYS;AUTH
SYS;COMSEC
SYS;ADDR
SYS;INIT
SYS;MISC
SYS;PTM
SYS;FORM
SYS;MDS
SYS;FSO
SYS;RD ) COMM messages
SYS;CED ) to
SYS;NORM) computer

Survey Function

SURV;DIR
SURV;TPAC
SURV:SCPST
SURV;SVTP
SURV;TPR
SURV;CRITER
SURV;PRTSVY
SURV;SEND
SURV;DELET
SURV;AZDIST
SURV;AZALT
SURV;AZHR
SURV;FAZ
SURV;TRAV
SURV;TRADJ
SURV;CCC
SURV;INTER
SURV;TRIANG
SURV;SINT
SURV;TRILAT
SURV;RE2
SURV;RE3

Meteorological Function

MET;DIR
MET;CM
MET;CW
MET;COMD

Figure 5. TACFIRE message formats.

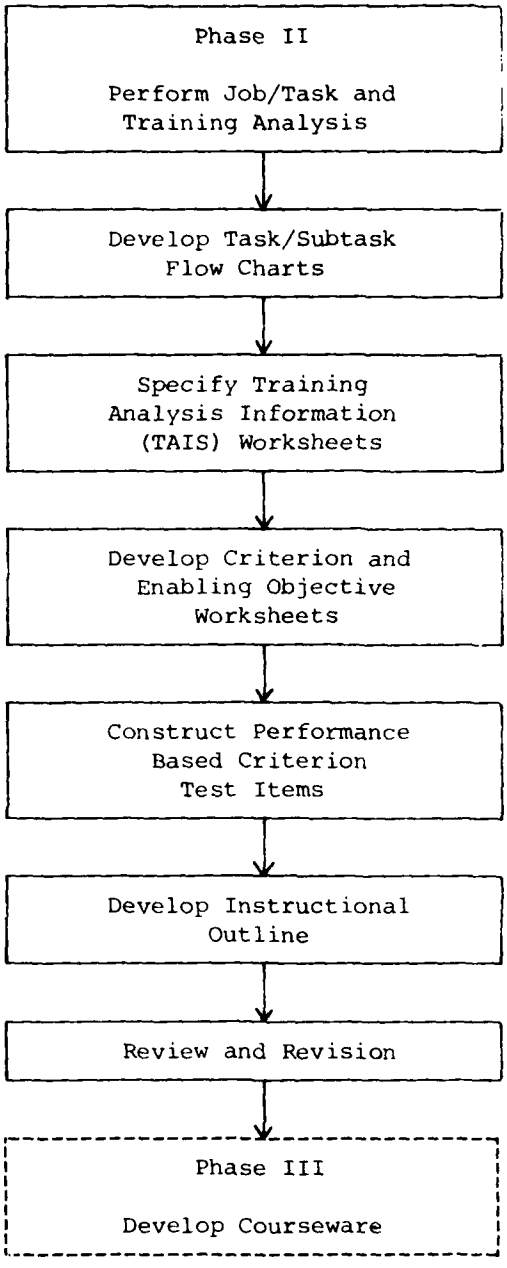


Figure 6. Phase II job/task and training analysis--developmental steps.

TAIS No. 3004 MODULE AFU

UNIT BAMOUP

TRAINING ANALYSIS INFORMATION SHEET

1. TASK IDENTIFICATION: 4.0

2. TASK: Update the ammunition inventory for an active FU to reflect ammunition received and verify data entries.

3. CONDITIONS: Given requirements to update current ammunition status of a FU to reflect ammunition received, select correct message format and fill in appropriate entries. Given the requirement to print and interpret AFU 2204 FU AMMO SUMMARY output message, select correct message format to print output message and interpret contents. Given different formatted test items concerning the updating of the ammunition status for a FU and AFU 2204 FU AMMO SUMMARY output message, provide correct response.

4. STANDARD: No errors.

5. TASK ANALYSIS:

| TASK ELEMENTS | PREREQUISITE KNOWLEDGE OR SKILL REQUIREMENTS | SUPPLEMENTAL TRAINING MATERIAL | REFERENCES |
|---|---|---|---|
| 4.1 Select and display AFU; BAMOUP message. | 4.1 Know operation of ACC component parts. | 1. Picture/ drawing of ACC. | DTM 11-7440-240-10 |
| 4.2 Identify entries for ammunition data. | 4.2 Know operation of ACC component parts. | 2. Entry data and AFU; BAMOUP format. | Chapter 4 Pages 4-159 through 4-176D. |
| 4.3 Identify results of computer action. | 4.3 None. | 3. Picture of AFU 2204 FU AMMO SUMMARY output message. | Chapter 6 Pages 6-1 through 6-6; 6-21 through 6-26; 6-75 through 6-103 |
| 4.4 Print AFU 2204 FU AMMO SUMMARY output message. | 4.4 Know how to select and display AFU user command message. | 4. Additional material to be developed as required | |
| 4.5 Interpret AFU 2204 FU AMMO SUMMARY contents. | 4.5 Able to decode mnemonics. | | |

Figure 7. TAIS for a TACFIRE functional area topic: Ammunition and Fire Unit (AFU) Function.

TAIS No. 3004 MODULE AFU

UNIT BAMOUP

CRITERION AND ENABLING OBJECTIVES

TASK IDENTIFICATION: 4.0

TASK ELEMENTS: 4.1 - 4.5

| CRITERION OBJECTIVE(S) | ENABLING OBJECTIVE(S) |
|---|---|
| 4.1 Given a picture/drawing of the ACC switch panel assembly, identify the switch actions that can be used to select and display the AFU;BAMOUP message. The switch matrix is referenced by letters for rows and numbers for columns. The student is able to match the correct letter/number combination to select the required message format. The correct steps are:<br><br>a. Depress switches B and 3.<br><br>b. Activate FORMAT COMMAND switch.<br><br>4.2 Given information to update the ammunition status of a FU to reflect ammunition received, the student will identify the data to simulate the completion of the AFU;BAMOUP input message. Data entries will include:<br><br>• Fire Unit<br><br>• Ammunition received<br><br>• Ammunition characteristics<br><br>• Powder characteristics<br><br>(Data to be specified) | 4.1.1 Pick from a list the purpose of the AFU;BAMOUP message as being: MAINTAIN AMMUNITION DATA FOR A FU.<br><br>4.2.1 State ON THE CED as being where the AFU;BAMOUP will display after being selected.<br><br>4.2.2 Match the following mnemonics with their definition.<br><br>a. FU - Fire Unit<br><br>b. AMOR - Ammunition received<br><br>c. PROJA - PROJB - Ammunition characteristics<br><br>d. PLOT - Powder characteristics<br><br>Note: Explanation of additional mnemonics will be included within the instructional material for student review.<br><br>4.2.3 Pick from a list the entry that is always required in the AFU;BAMOUP message as being: FU. |

Figure 8. Criterion and Enabling Objectives Worksheet: AFU Function.

TAIS No. 3004

MODULE AFU

UNIT BAMOUP

TEST ITEMS

TASK IDENTIFICATION: 4.0

TASK ELEMENTS: 4.1 - 4.5

| CRITERION ITEM(S) | ENABLING ITEM(S) |
|---|---|
| 4.1 Refer to Figure ___. Assume one of the fire units in your Bn has received additional supplies of ammunition which must be added to their ammunition inventory. As a first step you need to select the message format so that you can enter this information and update the ammunition status for the FU. From the list of steps given below, first select the procedural steps required and then place them in the correct order.<br><br>a. Activate FORMAT SELECT switch.<br><br>b. Activate FORMAT COMMAND switch.<br><br>c. Activate REPLACE switch.<br><br>d. Depress switches G and 3.<br><br>e. Depress switches B and 3.<br><br>(e, b) | 4.1.1 The AFU;BAMOUP message is used to:<br><br>a. Maintain data on backup units.<br><br>b. Assist Bn in maintaining Battery availability files.<br><br>c. Maintain ammunition data for a FU.<br><br>d. Set amount of ammunition that can be expended by each Battery.<br><br>4.2.1 After being selected by the appropriate switch actions, the AFU;BAMOUP message format will appear on the (RD/CED)?<br><br>4.2.2 From the following list, match each mnemonic with its definition and function.<br><br>a. Powder characteristics<br><br>b. Fire Unit<br><br>c. Ammunition received<br><br>d. Ammunition characteristics<br><br>FU (b)<br><br>PROJB (d)<br><br>PLOT (a)<br><br>PROJA (d)<br><br>AMOR (c) |
| 4.2 One of your FUs has received a supply of ammunition to replace previously expended ammunition. You have already selected the AFU;BAMOUP format message (Figure C) and must now enter the information to update the ammunition inventory for the FU. Answer the following questions concerning the entry of data into | |

| CRITERION ITEM(S) | ENABLING ITEM(S) |
|---|---|
| the AFU;BAMOUP message format.<br><br>(Sample data and questions)<br><br>Data to be included in Figure D.<br><br>• Btry B, 1st Bn, 41st Regiment. | |

Figure 9. Test Item Worksheet: AFU Function.

- Test items must be performance-based and job-oriented and require the student to demonstrate skills and knowledge directly related to the criterion objectives.
- Each test item must elicit measurable behavior.
- The structure of the test item must be positively oriented.
- Multiple-choice items must have at least four alternatives.
- The test item must be amenable to CRT presentation or CRT presentation plus a simple off-line exhibit.

Figure 10. Guidelines for developing test items.

Phase III. Develop Courseware

The design of each course module (functional area) is shown in Figure 11. Performance measures include Form A (Pretest), Form B (Posttest) of the Module tests (middle section), the criterion test element within each lesson (bottom section), and individual items within the instructional element. The evaluation element of each lesson evaluates the test scores (done automatically), provides the results, and branches the student to the next lesson or to a remedial path depending upon his performance. In developing the lesson and module performance measures certain ground rules (shown in Figure 12) were observed. These ground rules help establish a close one-to-one relationship between the job situation and the performance measurement situation.

The development of the CAI sequence used to measure operational performance adheres to the task elements in the TAIS, criterion and enabling objectives, and test items shown in Figures 7, 8, and 9.

At the start of each test, the two frames shown in Figure 13 are presented on the CRT. These alert the student to the cues provided by the operational situation and reference the pictures of the Artillery Control Console provided in the off-line course exhibits.

Just prior to this sequence, in task element 4.1, the performance measured was the ability to associate the incoming ammunition message with the AFU;BAMOUP message format, and to select and display the format. In the CAI sequence for task element 4.2 shown in Figure 14, the performance measured is correct completion of the AFU;BAMOUP message format. The tactical message and the ACC display (Figure 15) are provided to the student to answer the questions posed by the CAI text in the off-line course exhibits. This combination of CAI text and exhibits provides an accurate operational environment and a tactical situation in which the student's job performance can be measured. It should be noted that the audit trail is maintained in that the header line of each CAI test frame (which the student does not see) includes the TAIS identifier, i.e., AFU 4.2.

In conclusion, an examination of task elements 4.1 and 4.2 in the TAIS 3004 (Figure 7) indicates that the performance that must be measured in order to assess whether task elements 4.1 and 4.2 have been properly addressed is that shown in Figure 16. These performance measures are those suggested in the Phase I analysis and delineated in Phases II and III. The development cycle is thus completed. Systematic application of the notion of CAI performance measures of job performance within the operational context has produced a technique to permit development of additional valid measures of job performance.

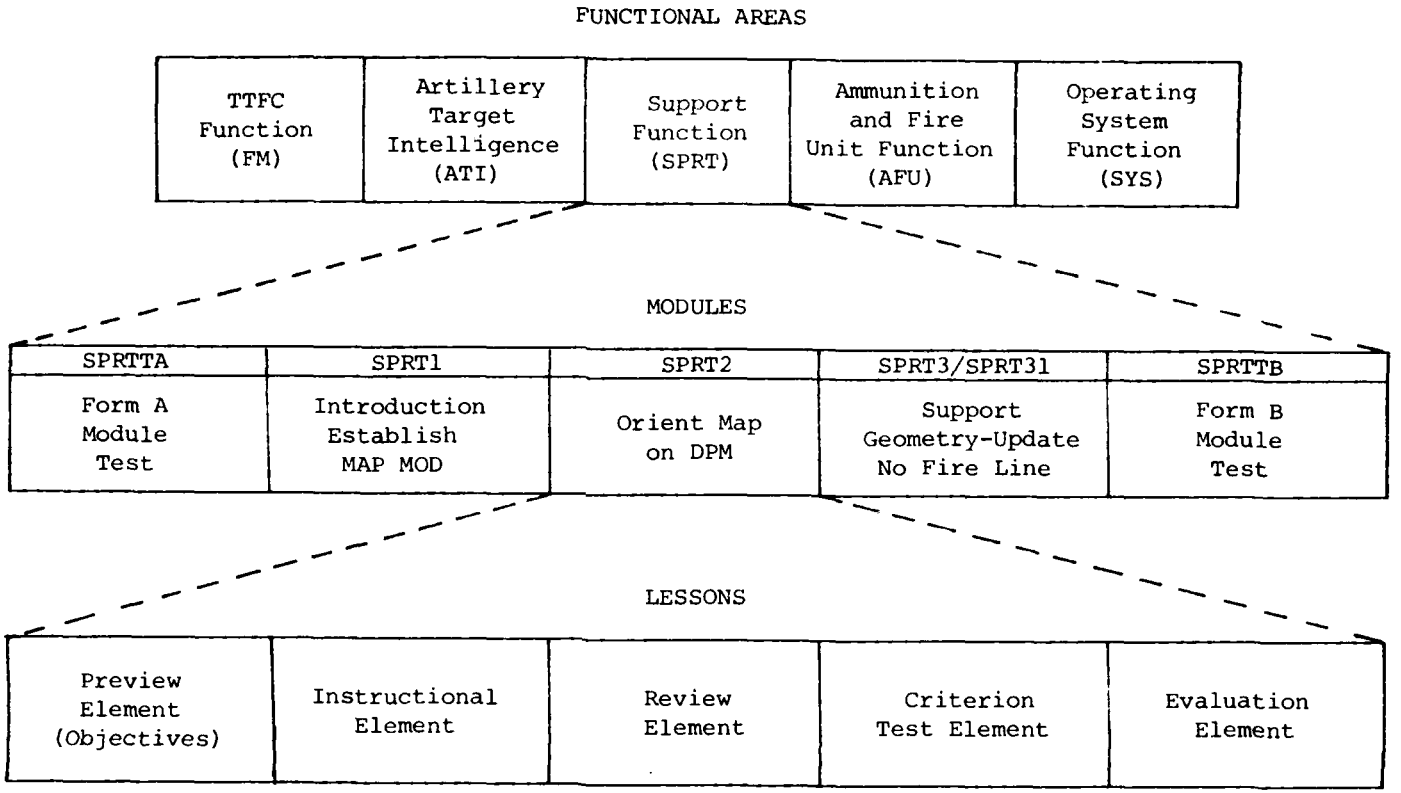


Figure 11. Organization of TACFIRE AI courseware.

- Provide all the relevant cues and stimuli that are part of the tactical operation.
- Use context examples of TACFIRE message formats, displays, and messages that are relevant to the relevant to the TACFIRE operational environment.
- Maintain functional context by testing TACFIRE operations and message formats in the order they are encountered on the job.
- Provide clear instructions as to the situation and what the task is.

Figure 12. Ground rules for developing TACFIRE performance measures.

IN CONDUCTING TACFIRE OPERATIONS, YOU WILL BE SITTING AT THE ACC, OBSERVING THE DISPLAYS ON THE RD AND CED, AND USING THE SPA AND KEYBOARD TO CARRY OUT YOUR ACTIONS. THIS JOB SITUATION PROVIDES MANY CUES AS TO WHAT ACTIONS ARE TAKEN AND HOW THEY ARE TAKEN. FOR EXAMPLE, YOU DO NOT NEED TO MEMORIZE THE NAME OF A SWITCH. ALL YOU NEED TO DO IS PICK IT OUT ON THE SPA. (TYPE GO)

a. Frame 3.00

USE THIS JOB SITUATION IN TAKING THE TEST. PICTURES OF THE ACC (FIGURE 1) AND THE SPA (FIGURE 2) ARE INCLUDED IN THE TEST EXHIBITS. REFER TO THEM WHENEVER YOU LIKE AND USE THEM TO "VISUALIZE" THE STEPS REQUIRED IN CARRYING OUT THE ACTIONS REQUIRED. NOW FOR THE TEST QUESTIONS.

b. Frame 4.00

Figure 13. CAI frames referencing the tactical environment and clues.

YOUR BN HAS RECEIVED A SUPPLY OF AMMUNITION AND THIS INFORMATION NEEDS TO BE ENTERED INTO THE TACFIRE COMPUTER. YOU HAVE ALREADY SELECTED AND DISPLAYED AN EMPTY AFU;BAMOUP MESSAGE FORMAT (FIGURE 7) AND NOW NEED TO ENTER THE DATE (FIGURE 6) TO UPDATE THE AMMO STATUS FOR THE FIRE UNIT. (TYPE GO)

a. Frame 19.0

REFER TO FIGURES 6 and 7. WHICH OF THE FOLLOWING IS THE CORRECT ENTRY TO SPECIFY THE FIRE UNIT?

A. FU: /B/1/41/ ;
B. FU:B/ / / /141;
C. FU: / /B/1 /41 ;
D. FU: / /1/41/B ;

(ENTER A LETTER)

b. Frame 20.0

REFER TO FIGURES 6 AND 7. WHICH OF THE FOLLOWING IS THE CORRECT ENTRY FOR ENTERING THE AMMUNITION CHARACTERISTICS RECEIVED?

A. PROJA: 30/X/ILA.1/ 33,
B. PROJA:ILA1/I/ 30. /33.0,
C. PROJA: /X/ 33.0/ILA1,
D. PROJA:ILA1/I/ 33.0/ 30,

(ENTER A LETTER)

c. Frame 21.0

Figure 14. CAI test frames presented on CRT.

- FIRE UNIT: B BTRY, 1/41ST
- ACCOUNTING PROCEDURE: AMMUNITION RECEIVED
- AMMUNITION CHARACTERISTICS

  CATEGORY: 1LA1
  LOT DESIGNATOR: I
  WEIGHT: 33.Ø
  QUANTITY: 3Ø

- POWER CHARACTERISTICS

  MODEL: M67
  LOT DESIGNATOR: X
  QUANTITY: 1ØØ

- FUZE CHARACTERISTICS

  CATEGORY: TIB
  QUANTITY: 3Ø

a. Ammunition message

```
      ;P: ;SB: / / /  /   ;C:   ;SG:  ,  ;DT:  ,  /  /  ;ID:    ;A: ;
AFU;BAMOUP;FU: / / /  /   ;AMOR: ;AMOE: ;AMOH: ;PLAN:      ;STDODD: / ;
PROJA:    / /   . /    ,    / /   . /    ,    / /   . /    ;
PROJB:    / /   . /    ,    / /   . /    ,    / /   . /    ;
PLOT:    / /    ,    / /    ,    / /    ;DTG:  /  /  ;
FZES:    /    ,    /    ,    /    ,    /    ,    /    ,    /    ;BKUP: ;
MYIELD:     /      /  ,    /      /  ,    /      /  ,    /      /
```

b. Empty AFU/BAMOUP displayed on CED

Figure 15. Ammunition message and empty AFU;BAMOUP message format--off-line course exhibit.

The ability to:

- Associate an incoming message with the required message format
- Select and display the message format
- Correctly fill in the format
- Process the format by taking computer action and transmitting to the units requiring them.

Figure 16. Performance measured.

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